Preface

Thank you for choosing DELTA's IBLM Series (Integrated BrushLess Motor). The IBLM Series is manufactured with high-quality components and materials and incorporate the latest microprocessor technology available.

This manual is to be used for the installation, parameter setting, troubleshooting, and daily maintenance of the IBLM. To guarantee safe operation of the equipment, read the following safety guidelines before connecting power to this product.

To ensure the safety of operators and equipment, only qualified personnel familiar with IBLM are to do installation, trial run and parameter setting. Always read this manual thoroughly before using IBLM series, especially the WARNING, DANGER and CAUTION notes. Failure to comply may result in personal injury and equipment damage. If you have any question, please contact your dealer.

This product sold to U.S is only suitable for dryer, washing machine, conveyer and elevator door application.

PLEASE READ PRIOR TO THE INSTALLATION FOR SAFETY PURPOSE.



- DC input power must be disconnected before any wiring to IBLM is made.
- Never reassemble internal components or wiring.
- Ground the IBLM series using the ground terminal. The grounding method must comply with the laws of the country where IBLM series is to be installed. Refer to the Basic Wiring Diagram.
- IBLM series shall NOT be used for life support equipment or any life safety situation.
- To prevent personal injury, please keep children and unqualified people away from the equipment.



- DO NOT use Hi-pot test for internal components. The semi-conductor used in IBLM easily damage by high-voltage.
- A charge may still remain in the DC-link capacitors with hazardous voltages, even if the power has been turned off. To prevent personal injury, please ensure that power has turned off before opening IBLM and wait for the capacitors to discharge to safe voltage levels.
- Only qualified persons are allowed to install, wire and maintain IBLM.



- DO NOT install the IBLM in a place subjected to high temperature, direct sunlight, high humidity or liquids.
- Only use IBLM series within specification. Failure to comply may result in fire, explosion or electric shock.



- To describe the internal components of the product, it will show the product picture without cover or safe components in the manual. To guarantee safe operation of this product, please wire and install the cover correctly during operation.
- The picture in this manual may be different from the product you receive but it still has the same product guarantee.

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Chapter 1 Introduction

The IBLM should be kept in the shipping carton or crate before installation. In order to retain the warranty coverage, the IBLM should be stored properly when it is not to be used for an extended period of time. Storage conditions are:



- Store in a clean and dry location free from direct sunlight or corrosive fumes.
- Store within an ambient temperature range of -40 °C to +70 °C.
- Store within a relative humidity range of 0% to 100% and non-condensing environment.
- DO NOT place on the ground directly. It should be stored properly. Moreover, if the surrounding environment is humid, you should put exsiccator in the package.
- DO NOT store in an area with rapid changes in temperature. It may cause condensation and frost.
- If the IBLM is stored for more than 3 months, the temperature should not be higher than 30 °C. Storage longer than one year is not recommended, it could result in the degradation of the electrolytic capacitors.
- When the IBLM is not used for more than one year, it needs to recharge the drive capacity before operation. It is recommended to recharge for each year for good capacity. Before recharging the capacity, please make sure that the storage environment is clean and dry.

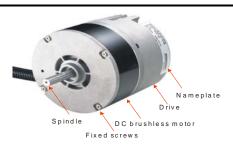
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1.1 Receiving and Inspection

This IBLM has gone through rigorous quality control tests at the factory before shipment. After receiving the IBLM, please check for the following:

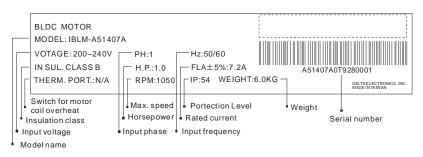
- Inspect the unit to assure it was not damaged during shipment.
- Make sure that the part number indicated on the nameplate corresponds with the part number printed on the shipping carton or crate.

1.1.1 Drive Appearance



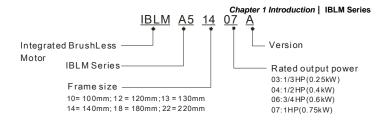
1.1.2 Nameplate Information

Example for IBLM-A51407A 1-phase 1.0HP

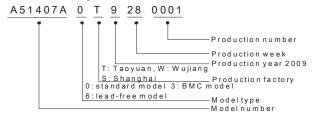


1.1.3 Model Explanation

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1.1.4 Series Number Explanation



If the nameplate information does not correspond to your purchase order or if there is any problem, please contact your distributor.

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1.2 Preparation for Installation and Wiring

1.2.1 Ambient Conditions

Install the IBLM in an environment with the following conditions:

- It needs to reserve enough space for temperature rise situation to prevent overheating due to bad ventilation.
- To prevent overheating, it needs to have heat sink equipment when it doesn't have enough space for heat dissipation.
- To prevent vibration, it needs to have vibration absorbers or anti-vibration rubber when there is any vibration.
- If there is any interference, such as big magnetic switches or welders, it needs to add an FMI filter

an Livi inter.						
	Air Temperature	-40 ~ +60°C				
	Relative Humidity	0 to 100%(RH), no condensation allowed				
Operation	Atmosphere pressure	86 ~ 106 kPa				
	Installation Site Altitude	<1000m				
	Vibration	<20Hz: 9.80 m/s ² (1G) max 20 ~ 50Hz: 5.88 m/s ² (0.6G) max				
	Temperature	-40°C ~ +70°C				
Storage	Relative Humidity	0 to 100%, no condensation allowed				
Transportation	Atmosphere pressure	86 ~ 106 kPa				
	Vibration	<20Hz: 9.80 m/s² (1G) max 20 ~ 50Hz: 5.88 m/s² (0.6G) max				
Pollution Degree	2: good for a factory type environment.					

1.2.2 Installation Environment

A3 series (indoor): IBLM-A31403A, IBLM-A31404A, IBLM-A31406A, IBLM-A31407A
A5 series (outdoor HAVC): IBLM-A51403A, IBLM-A51404A, IBLM-A51406A, IBLM-A51407A

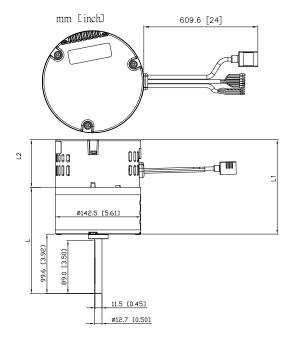
- 1. Install in a well ventilation place
- 2. Install in a clean and dry location free from corrosive fumes, oil and iron powder
- 3. Install in a place without vibration
- 4. Install in a place without magnetic interference

- 1. Too tight wiring of IBLM may cause drive damage due to the vibration during operation.
- 2. Ensure that every component has been fixed.
- Please make sure that the connection between the motor shaft and transmitter is correct and the space between shaft and mechanism is suitable.
- 4. Please contact your dealer if you have any problem during installation.

1.3 Dimensions

Dimensions are in millimeter and [inch]

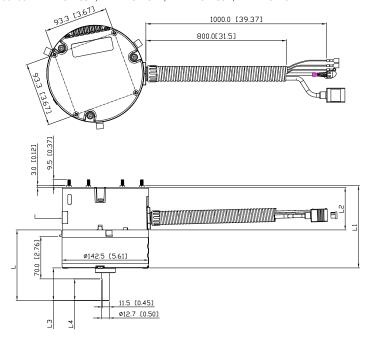
1. A3 series: IBLM-A31403, IBLM-A31404B, IBLM-A31406B, IBLM- A31407B



	1/3HP	1/2HP	3/4HP	1HP
L	164.1(6.46)	171.1(6.74)	177.1(6.97)	182.1(7.1)
L1	134.5(5.30)	141.5(5.57)	147.5(5.81)	152.5(6.00)
L2	70.0(2.76)	70.0(2.76)	70.0(2.76)	70.0(2.76)

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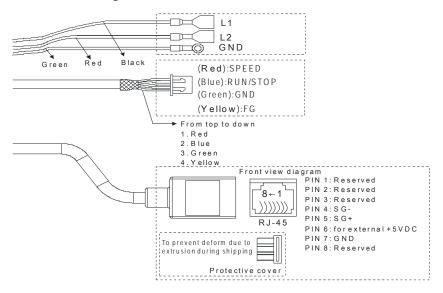
2. A5 series: IBLM-A51403A, IBLM-A51404A, IBLM-A51406A, IBLM-A51407A



	1/3HP	1/2HP	3/4HP	1HP
L	116.1(4.57)	171.1(6.74)	177.1(6.97)	182.1(7.17)
L1	135.5(5.33)	141.5(5.57)	147.5(5.81)	152.5(8.00)
L2	70.0(2.76)	70.0(2.76)	70.0(2.76)	70.0(2.76)
L3	53.6(2.11)	99.6(3.92)	99.6(3.92)	99.6(3.92)
L4	35.6(1.40)	89.0(3.50)	89.0(3.50)	89.0(3.50)

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1.4 External Wiring



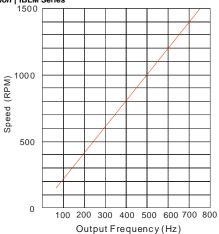
Ter	minal	Descriptions	Functions
	L1	Black wire Power Terminal	Mains power for the IBLM. AC 230V 1-phase 60Hz.
Power	L2	Red wire Power Terminal	Mains power for the IBLM. AC 230V 1-phase 60Hz. Red color.
	GND	Green wire Earth Connection	Ground for IBLM.

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Chapter 1 Introduction | IBLM Series

Terminal		Descriptions	Functions
	SPEED	Red wire Speed Control Terminal	To control the speed by setting Pr.01-00(source of operation/speed command) to 1(external terminals). 24VDC: input frequency of PWM pulse signal can be 80 to 120Hz and duty cycle= 20% to 95%. When the duty cycle=20%, it corresponds to Pr.01-05 min. operation frequency. When the duty cycle=95%, it corresponds to Pr.01-04 max. operation frequency.
Control	RUN/ STOP	Blue wire Start/Stop Control Terminal	To control the speed by setting Pr.01-00(source of operation/speed command) to 1(external terminals). 0VDC: stop running 24VDC: start running
	GND	Green wire Digital Signal Common	Common for digital inputs. Green color.
	FG	Yellow wire FG Output Terminal	FG(Frequency Generation) outputs frequency in Hz to show current speed (RPM) as shown in the following diagram.
	Pin1 to 3	Reserved	
	Pin 4	SG+ for Communication	SG+: communication data input
Communication	Pin 5	SG – for Communication	SG -: communication data output
Com	Pin 6	+5VDC	User needs to input +5VDC for communication power
	Pin 7	GND	+5VDC GND
	Pin 8	Reserved	

Chapter 1 Introduction | IBLM Series



FG output frequency vs. corresponding speed (RPM)

Chapter 1 Introduction | IBLM Series

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Chapter 2 Communication



- Make sure that the wiring is correct.
- Verify that no other equipment is connected to the motor.



It should be stopped when fault occurs during running.

2.1 How to Use Communication

There are two ways to use communication: 1. connect IBLM to human machine interface device, 2. connect IBLM to PC. It needs to connect to PC via VFD-USB01 or IFD8500 converter with Delta software VFDSoft (refer to Appendix B for details). After set-up, please set the communication as follows.

- 1. Set the communication speed to baud rate 4800 bits/sec
- 2. Set the communication format to ASCII (8, N, 1). The communication protocol ASCII (American Standard Code for Information Interchange) mode: Each byte data is the combination of two ASCII characters. For example, a 1-byte data: 64 Hex, shown as '64' in ASCII, consists of '6' (36Hex) and '4' (34Hex).
- 3. ASCII mode: it is hexadecimal. Each character indicates an ASCII code as shown in the following.

Character	'0'	'1'	'2'	ŝ	'4'	' 5'	·6	'7'
ASCII code	30H	31H	32H	33H	34H	35H	36H	37H

Character	'8'	'9'	'A'	'B'	,C,	'D'	'E'	'F'
ASCII code	38H	39H	41H	42H	43H	44H	45H	46H

4 Communication data frame

ASCII mode:

STX	Start character ':' (3AH)
Address Hi	Communication address:
Address Lo	8-bit address consists of 2 ASCII codes
Function Hi	Command code:
Function Lo	8-bit command consists of 2 ASCII codes

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Chapter 2 Communication | IBLM Series

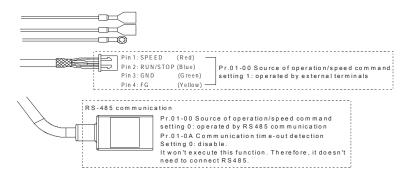
DATA (n-1) to DATA 0	Contents of data: Nx8-bit data consist of 2n ASCII codes n<=20, maximum of 40 ASCII codes (20 x 8-bit data)
LRC CHK Hi	LRC check sum:
LRC CHK Lo	8-bit check sum consists of 2 ASCII codes
END Hi	End characters:
END Lo	END Hi= CR (0DH), END Lo= LF(0AH)

2.2 Operation Method

The operation method can be set via either RS485 interface or external terminals. The source of operation command can be set by parameter 01-00 (source of operation/speed command).

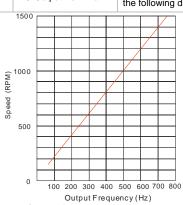
When Pr.01-00 is set to 0: the source of operation/speed command is from RS485 interface (refer to Appendix B for details)

When Pr.01-00 is set to 1: the source of operation/speed command is from external terminals (refer to following explanation for details)



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1	Terminal	Descriptions	Functions
			To control the speed by setting Pr.01-00(source of operation/speed command) to 1(external terminals).
	Red Wire SPEED	Red wire Speed Control	24VDC: input frequency of PWM pulse signal can be 80 to 120Hz and duty cycle= 20% to 95%. When the duty cycle=20%, it corresponds to Pr.01-05 min. operation frequency. When the duty cycle=95%, it corresponds to Pr.01-04 max. operation frequency.
Control	RUN/STOP	Blue wire Start/Stop Control	To control the speed by setting Pr.01-00(source of operation/speed command) to 1(external terminals). 0VDC: stop running 24VDC: start running
	GND	Green wire Digital Signal Common	Common for digital inputs. Green color.
	FG	Yellow wire FG Output Terminal	FG(Frequency Generation) outputs frequency in Hz to show current speed (RPM) as shown in the following diagram.



FG output frequency vs. corresponding speed (RPM)

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Chapter 2 Communication | IBLM Series



In the identity code A08B of Pr.00-00, if it shows 0 in A, it means that it is the model with 5 I/O. These 5 I/O external terminals can be used for multi-speed switch. When Pr.01-00 is set to 1 (External terminals), it can switch the speed by setting Pr.02-07 (1st Step Speed/Torque) to Pr.02-0B (5th Step Speed/Torque).

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Chapter 3 Parameters

The IBLM parameters are divided into 5 groups by property for easy setting. In most applications, the user can finish all parameter settings before start-up.

The 5 groups are as follows:

Group 00: System Parameters

Group 01: Basic Parameters

Group 02: Multi-Step Speed and Torque Parameters

Group 03: Protection Parameters

Group 04: Start-up Parameters

3.1 Summary of Parameter Settings

 \mathcal{N} : The parameter can be set during operation.

Group 00 System Parameters

Parameter	Explanation	Settings	Factory Setting	Customer
00-00	Identity Code of the IBLM	Read-only (depend on models)	#.##	
00-01	Rated Current Display of the IBLM	Read-only (depend on models)	#.##	
00-02	Rate Torque Display of the IBLM	Read-only (depend on models)	#.##	
00-03	Software Version	Read-only	#.##	

Group 01 Basic Parameters

Parameter	Explanation	arameter Explanation Settings		Customer
	Source of	0: RS485 communication		
01-00 Operation/Speed Command		1: External terminals	1	
01-01	Communication Address	1 to 254	1	
01-02	Control Mode	0: Speed mode 1: Torque mode 2: Airflow mode	0	
⊮ 01-03	Motor Direction Control	O: Forward operation (CCW) (view from motor shaft) 1: Reverse operation (CW)	0	
 ∕ 01-04	Max. Operation Speed	80 to 1500 RPM	1050	
№ 01-05	Min. Operation Speed	80 to 1500 RPM	150	
№ 01-06	Acceleration Time	0.2 to 15.0 sec	5.0	
№ 01-07	Deceleration Time	0.2 to 15.0 sec	5.0	
№ 01-08	Brake Speed	80 to 1500 RPM	150	
№ 01-09	Stop Speed	80 to 1500 RPM	200	
01-0A	Communication Time-out Detection	0.01 to 8.00 sec (0: disable)	8.00	
01-0B	Parameter Reset	0: Disable 1: All parameters are reset to factory settings 5: Save parameters to EEPROM	0	
01-0C	Auto-learning at Start-up	Disable Execute auto-learning again Execute auto-learning again and again	0	

Group 02: Multi-Step Speed and Torque Parameters

Parameter	Explanation	Settings	Factory Setting	Customer
№ 02-00	Speed/Torque Command	0 to 250%	100	
⊮ 02-01	Airflow Command	0 to 65535 m ³ /H	0	
№ 02-02	First Point of Airflow Graph	0 to 65535 m ³ /H	0	
№ 02-03	Second Point of Airflow Graph	0 to 65535 m ³ /H	0	
№ 02-04	Third Point of Airflow Graph	0 to 65535 m ³ /H	0	
№ 02-05	Fourth Point of Airflow Graph	0 to 65535 m ³ /H	0	
⊮ 02-06	Fifth Point of Airflow Graph	0 to 65535 m ³ /H	0	
⊮ 02-07	1st Step Speed/Torque	0 to 250%	0	
⊮ 02-08	2nd Step Speed/Torque	0 to 250%	0	
⊮ 02-09	3rd Step Speed/Torque	0 to 250%	0	
 ∕ 02-0A	4th Step Speed/Torque	0 to 250%	0	
⊮ 02-0B	5th Step Speed/Torque	0 to 250%	0	
 ∕ 02-0C	Test Speed	0 to 1500 RPM	0	

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Group 03 Protection Parameters

Parameter	Explanation	Settings	Factory Setting	Customer
		00: No fault		
		01: Over current (oc)		
03-00	Present Fault Record	02: Over voltage (ov)		
		03: Overheat (oH)		
		04: Overload (oL)		
		05: Low voltage (Lv)		
		06: Start-up failure		
		07: EEPROM error		
03-01	Second Most	08: U phase is shorted to P	0	
	Recent Fault Record	09: U phase is shorted to N		
		10: V phase is shorted to P		
		11: V phase is shorted to N		
		12: W phase is shorted to P		
03-02	Third Most Recent	13: W phase is shorted to N		
	Fault Record	14: U phase is shorted to V		
		15: V phase is shorted to W		
		16: W phase is shorted to U		

Group 04: Start-up Parameters

Parameter	Explanation	Settings	Factory Setting	Customer
04-00	Start-up Current	1 to 250%	10	
04-01	Reserved			
04-02	Reserved			
04-03	Reserved			
04-04	DC Brake Time	10 to 250	100	
04-05	DC Brake Current Level	1 to 250%	10	

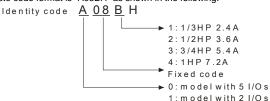
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3.2 Descriptions of Parameter Settings

Group 00: System Parameters

00-00	Identity Co	ode of the IBLM		
	Settings	Read Only	Factory setting:	#.##

The complete code format is "A08BH" as shown in the following.



00-01	Rated Current Display of the IBLM	
	Settings Read Only	Factory setting: #.##
00-02	Rated Torque Display of the IBLM	
	Settings Read Only	Factory setting: #.##

- Parameter 00-00 displays the identity code of the IBLM. The capacity, rated current, rated voltage and the max. carrier frequency relate to the identity code. Users can use the following table to check how the rated current, rated voltage and max. carrier frequency of the IBLM correspond to the identity code.
- Parameter 00-01 displays the rated current of the IBLM. By reading this parameter the user can check if the IBLM is correct.

kW	0.25	0.4	0.6	0.75	0.25	0.4	0.6	0.75
HP	1/3	1/2	3/4	1	1/3	1/2	3/4	1
Pr.00-00	0081	0082	0083	0084	1081	1082	1083	1084
Rated Current	2.4	3.6	5.4	7.2	2.4	3.6	5.4	7.2
Rated Torque	2.28	3.55	5.10	6.76	2.28	3.55	5.10	6.76
Max. Carrier Frequency	15kHz							

00-03	Software Ver	Software Version			
	Settings	Read Only			
	Display	#.##			

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01-00	Source of C	neration/Sr	peed Command

Factory Setting: 1

Settings 0 RS485 communication

External terminals

This parameter is set the source of operation and speed command.

01-01	Communicat	ion Address	
	Settings	1 to 254	Factory Setting: 1

If the IBLM is controlled by RS-485 serial communication, the communication address for this drive must be set via this parameter. And the communication address for each IBLM must be different and unique.

Address (Communication Address)

00H: broadcast to all drives

01H: drive of address 01

0FH: drive of address 15

10H: drive of address 16

:

FEH: drive of address 254

ASCII mode:

STX	Start character ':' (3AH)
Address Hi	Communication address:
Address Lo	8-bit address consists of 2 ASCII codes
Function Hi	Command code:
Function Lo	8-bit command consists of 2 ASCII codes
DATA (n-1)	Contents of data:
to	Nx8-bit data consist of 2n ASCII codes
DATA 0	n<=20, maximum of 40 ASCII codes (20 x 8-bit data)
LRC CHK Hi	LRC check sum:
LRC CHK Lo	8-bit check sum consists of 2 ASCII codes
END Hi	End characters:
END Lo	END Hi= CR (0DH), END Lo= LF(0AH)

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Function (Function code) and DATA (data characters)

The format of data characters depends on the function code.

03H: read data from register 06H: write single register

08H: loop detection

The available function codes and examples for IBLM are described as follows:

(1) 03H: multi read, read data from registers.

Example: reading continuous 2 data from register address 2102H, drive address is 01H. ASCII mode:

Command message:

STX ':'		
'.'		
'0'		
'1'		
'0'		
'3'		
'2'		
'1'		
'0'		
'2'		
'0'		
'0'		
'0'		
'2'		
'D'		
'7'		
CR		
LF		

Deenenee meeeeee

Response message:			
STX	٠.,		
Address	'0'		
Addless	'1'		
	'0'		
Function	'3'		
Number of data	'0'		
(Count by byte)	'4'		
O	'1'		
Content of starting address	'7'		
address 2102H	'7'		
210211	·0'		
Content of address 2103H	·0'		
	'0'		
	·0'		
	·0'		
LRC Check	'7'		
LING CHECK	'1'		
END	CR		
LIND	LF		

(2) 06H: single write, write single data to register.

Example: writing data 6000(1770H) to register 0100H. drive address is 01H. ASCII mode:

Command message:

Oommana mood	9
STX	·.·
Address	'0'
Address	'1'
Function	'0'
Function	'6'
Data address	'0'
	'1'
	'0'
	'0'
Data content	'1'
	'7'
	'7'

Response message:		
STX	4.9	
Address	'0'	
Address	'1'	
Function	'0'	
1 Unction	'6'	
Data address	'0'	
	'1'	
	'0'	
	'0'	
Data content	'1'	
	'7'	
	'7'	

Command message:

	0
	'0'
LRC Check	'7'
LKC Check	'1'
END	CR
END	LF

Response message:

	·0'
LRC Check	'7'
LRC CHECK	'1'
END	CR
END	LF

Address list

The contents of available addresses are shown as below:

contents of available addresses are shown as below:					
Content	Address		Function		
Parameters	GGnnH	GG means parameter group, nn means parameter number, for example, the address of Pr 04-01 is 0401H.			
		Bit 0-1	00B: No function 01B: Stop 10B: Run 11B: No function		
	2000H	Bit 2-3	Reserved		
Command Write only	2000H	Bit 4-5	00B: No function 01B: No function 10B: No function 11B: Change direction		
		Bit 6-15	No function		
	2001H		Reserved		
			No function		
	2002H	Bit 1	1: Reset		
		Bit 2-15	Reserved		
	2003H	Test mode	command		
Status monitor Read only Status monitor 2100H 00: No fault 01: Over current (oc)					
		00: No fault			
		01: Over cu	current (oc)		
02: Over voltage (ov)			oltage (ov)		
	03: Overheat (oH)				
		04: Overload (oL)			
		05: Low vol	tage (Lv)		
		06: Start-up failure			

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Content Address Function 07: Reserved 08: U phase is shorted to P 09: U phase is shorted to N 10: V phase is shorted to P 11: V phase is shorted to N 12: W phase is shorted to P 13: W phase is shorted to N 14: U phase is shorted to V 15: V phase is shorted to W 16: W phase is shorted to U Status of AC drive 00: RUN LED is off, STOP LED is on (IBLM sto
08: U phase is shorted to P 09: U phase is shorted to N 2100H 10: V phase is shorted to P 11: V phase is shorted to N 12: W phase is shorted to P 13: W phase is shorted to N 14: U phase is shorted to V 15: V phase is shorted to W 16: W phase is shorted to U Status of AC drive
09: U phase is shorted to N 2100H 10: V phase is shorted to P 11: V phase is shorted to N 12: W phase is shorted to P 13: W phase is shorted to N 14: U phase is shorted to V 15: V phase is shorted to W 16: W phase is shorted to U Status of AC drive
2100H 10: V phase is shorted to P 11: V phase is shorted to N 12: W phase is shorted to P 13: W phase is shorted to N 14: U phase is shorted to V 15: V phase is shorted to W 16: W phase is shorted to U Status of AC drive
11: V phase is shorted to N 12: W phase is shorted to P 13: W phase is shorted to N 14: U phase is shorted to V 15: V phase is shorted to W 16: W phase is shorted to U Status of AC drive
12: W phase is shorted to P 13: W phase is shorted to N 14: U phase is shorted to V 15: V phase is shorted to W 16: W phase is shorted to U Status of AC drive
13: W phase is shorted to N 14: U phase is shorted to V 15: V phase is shorted to W 16: W phase is shorted to U Status of AC drive
14: U phase is shorted to V 15: V phase is shorted to W 16: W phase is shorted to U Status of AC drive
15: V phase is shorted to W 16: W phase is shorted to U Status of AC drive
16: W phase is shorted to U Status of AC drive
Status of AC drive
00: RUN LED is off. STOP LED is on (IBLM sto
01: RUN LED blinks, STOP LED is on (When IBLM decelerates to stop)
Bit 0-1 10: RUN LED is on, STOP LED blinks (When IBLM is standby)
11: RUN LED is on, STOP LED is off (When IBI runs)
2101H Bit 2 Reserved
Bit 3-4 00: FWD LED is on, REV LED is off (When IBLI runs forward)
01: FWD LED is on, REV LED blinks (When IBI runs from reverse to forward)
10: FWD LED blinks, REV LED is on (When IBI runs from forward to reverse)
11: FWD LED is off, REV LED is on (When IBLI runs reverse)
Bit 5-15 Reserved
2102H Output speed (rpm)
2103H Feedback speed (rpm)
2104H Output current (A)
2105H DC BUS voltage (VDC)
2106H IGBT temperature (°C)

Content	Address	Function
	2107H	Communication Fault Code
		01: Illegal function code
		02: Illegal data address
		03: Illegal data value
		04: illegal command
		06: Check sum error
		09: Data length error
		10: Frame error
	2108H	Torque command (%)
	2109H	Torque feedback (%)
	210AH	Software information

01-02 Control Mode)
--------------------	---

Factory Setting: 0

Settings	0	Speed mode
	1	Torque mode
	2	Airflow mode

- When setting to 0: user can give the speed command by requirement to control speed.
- When setting to 1: user can give the torque command by requirement to control torque.
- When setting to 2: user can execute airflow control by requirement.

Factory Setting: 0

Settings 0 Forward operation (CCW) (view from motor shaft)

1 Reverse operation (CW)

This parameter is used to enable one direction of rotation of the IBLM direction of rotation to prevent damage due to operation errors.

M otor direction



01-04

Unit: rpm

Settings	80 to 1500 RPM	Factory Setting: 1050

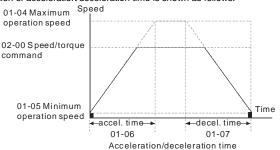
This parameter determines the IBLM's Maximum Output Speed.

01-05	 Minimum	Operation Speed	Unit: rpm
	Settings	80 to 1500 RPM	Factory Setting: 150

This parameter determines the IBLM's Minimum Output Speed.

01-06	∦ Accelera		
01-07	✓ Decelera	ation Time	Unit: second
	Settings	0.2 to 15.0 sec	Factory Setting: 5.0

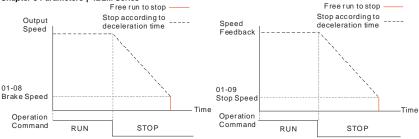
- The Acceleration Time is used to determine the time required for the IBLM to accelerate from Minimum Operation Speed (Pr.01-05) to Maximum Operation Speed (Pr.01-04). The Deceleration Time is used to determine the time required for the IBLM to decelerate from the Maximum Operation Speed (Pr.01-04) down to Minimum Operation Speed (Pr.01-05).
- If the setting of the deceleration time is too short, it may cause over-current during deceleration or over voltage of the IBLM and damage the motor or trigger the protection function.
- The definition of acceleration/deceleration time is shown as follows.



01-08		peed	Unit: rpm
	Settings	80 to 1500 RPM	Factory Setting: 150
01-09	✓ Stop Sp	eed	Unit: rpm
	Settings	80 to 1500 RPM	Factory Setting: 200

When IBLM receives a STOP command, the IBLM will decelerate by the setting of Pr.01-07 until the speed reaches Pr.01-08 and feedback speed (calculated from internal IBLM) is less than Pr.01-09. Then, it will free run to stop.

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Brake Speed vs. Stop Speed

01-0A	Communic	ation Time-out Detection	Unit: second
	Settings	0.01 to 8.00 sec (0: disable)	Factory Setting: 8.00

- After executing RUN command, it will start to detect. If there is no communication data during the communication time-out detection (set by Pr.01-0A), the motor will deceleration by Pr.01-07 deceleration time.
- This parameter is only valid when Pr.01-00(source of operation/speed command) is set to 0 (RS485 communication).

01-0B Parameter Reset

Factory Setting: 0

- Settings 0 Disable
 - 1 All parameters are reset to factory settings
 - 5 Save parameters to EEPROM
- When the parameter settings are abnormal, all parameters can be reset to factory setting by setting Pr.01-0B to 1.
- When Pr.01-0B is set to 5, it can save all parameters to EEPROM to prevent parameter settings loss during power failure. Pleaser notice that Pr.01-0B will be reset to 0 after saving parameter settings in EEPROM as Pr.01-0B is set to 5. Therefore, it needs to set Pr.01-0B to 5 whenever you want to save parameters in EEPROM.

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01-	OC Auto-lea	rning	g at Start-up
	<u> </u>		Factory Setting: 0
	Settings	0	Disable
		1	Execute auto-learning again
		2	Execute auto-learning again and again
	The start-up	fails	if it fails to try the current from the start-up current to max. start-up current.
	It will try fron	n the	min. current to max. current until start-up successfully.
	If it changes	the	setting from 1 or 2 to 0, the original trial value will be reset to the factory
	setting.		

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Group 02: Multi-Step Speed and Torque Parameters

**This parameter can be set during operation.

02-00	✓ Speed/To	rque Command	Unit: %
	Settings	0 to 250%	Factory Setting: 100

- This parameter is used to set the speed and torque command.
- When Pr.01-02 (control mode) is set to 0(speed mode) or 2(torque mode), it can set speed command and torque command by this parameter or change parameters from Pr.02-07 1st Step Speed/Torque to Pr.02-0B 5th Step Speed/Torque via external terminal.

02-01	⊮ Airflow Command	Unit: m³/H
02-02		Unit: m³/H
02-03		Unit: m³/H
02-04		Unit: m³/H
02-05		Unit: m³/H
02-06		Unit: m³/H
	Settings 0 to 65535 m ³ /H	Factory Setting: 0

When Pr.01-02(control mode) is set to 1(airflow mode), it needs to set Pr.02-01 airflow command, 5 points of airflow graph (Pr.02-02 to Pr.02-06) and multi-step speed/torque (Pr.02-07 to Pr.02-0B) to control airflow.

02-07					
02-08					
02-09					
02-0A					
02-0B		Unit: %			
	Settings 0 to 250%	Factory Setting: 0			

In the identity code A08B of Pr.00-00, if it shows 0 in A, it means that it is the model with 5 I/O.

These 5 I/O external terminals can be used for multi-speed switch. When Pr.01-00 is set to 1

(External terminals), it can switch the speed by setting Pr.02-07 (1st Step Speed/Torque) to Pr.02-0B (5th Step Speed/Torque).

02-0C		Unit: rpm	
	Settings	0 to 1500 RPM	Factory Setting: 0

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This speed is used to get the 5 points of airflow graph (Pr.02-02 to Pr.02-06) and multi-step speeds/torque (Pr.02-07 to Pr.02-0B).

Chapter 3 Parameters | IBLM Series

Group 03: Protection Parameters

03-00	Present Fault Record	
03-01	3-01 Second Most Recent Fault Record	
03-02	Third Most Recent Fault Record	

Factory Setting: 0

Displays	Descriptions		
00	No fault		
01	Over-current (oc)		
02	Over-voltage (ov)		
03	Overheat (oH)		
04	Overload(oL)		
05	Low voltage (Lv)		
06	Start-up failure		
07	EEPROM error		
08	U phase is shorted to P		
09	U phase is shorted to N		
10	V phase is shorted to P		
11	V phase is shorted to N		
12	W phase is shorted to P		
13	W phase is shorted to N		
14	U phase is shorted to V		
15	V phase is shorted to W		
16	W phase is shorted to U		

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Group 04: Start-up Parameters

04-00	Speed/Tor	que Command	Unit: %
	Settings	1 to 250%	Factory Setting: 10

This parameter is used to set the start-up current according to motor nameplate. The factory setting is 10% drive rated current.

04-01	Reserved
04-02	Reserved
04-03	Reserved

04-04	DC Brake Time		Unit: sec
	Settings	0.10 to 2.50 sec	Factory Setting: 1.00

This parameter is used to set the continuous time to put the DC brake current into motor at drive start-up.

04-05	DC Brake	Current Level	Unit: %
	Settings	1 to 250%	Factory Setting: 10

This parameter sets the level of DC brake current output to the motor during start-up. When setting DC Brake Current, the Rated Current (Pr.00-01) is regarded as 100%. It is recommended to start with a low DC Brake Current Level and then increase until proper holding torque has been achieved. Please NOTE that the DC Brake Current Level can't exceed the motor rated current to prevent motor damage.

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Appendix A Specifications

All IBLM series are 230V 1-phase models. It is divided into A3 and A5 series with power range 1/3 to 1HP. Refer to the following specifications for details.

A3 Series

	Voltage Class	230V Class				
	Model Number IBLM-A314A	03	04	06	07	
Ма	x. Applicable Motor Output (kW)	0.25	0.4	0.6	0.75	
Ма	x. Applicable Motor Output (hp)	1/3	1/2	3/4	1	
υg	Rated Output Torque (Nm/oz-ft)	2.28	3.55	5.10	6.76	
Rating	Maximum Output Voltage (V)	242V 1-phase Proportional to the Input Voltage 60Hz				
Output	Output Speed (RPM)	1~1500 RPM				
ō	Carrier Frequency (kHz)	15				
ng	Rated Input Current (A)	2.4	3.6	5.4	7.2	
ıt Rating	Voltage Tolerance	± 10%(198-242V)				
Input	Frequency Tolerance	± 5%(47~63 Hz)				
Cooling Method		Natural Cooling				
Control Method		Fixed airflow				
Enclosure Rating		IP20				
Efficiency (%)		85.9% at 1,050rpm/80 oz-ft				

A5 Series

	Voltage Class	230V Class				
	Model Number IBLM-A514A	03	04	06	07	
Ма	x. Applicable Motor Output (kW)	0.25	0.4	0.6	0.75	
Ма	x. Applicable Motor Output (hp)	1/3	1/2	3/4	1	
ng	Rated Output Torque (Nm/oz-ft)	2.28	3.55	5.10	6.76	
Rating	Maximum Output Voltage (V)	242V 1-phase Proportional to the Input Voltage 60Hz				
Output	Output Speed (RPM)	1~1500 RPM				
Õ	Carrier Frequency (kHz)	15				
ing	Rated Input Current (A)	2.4	3.6	5.4	7.2	
ut Rating	Voltage Tolerance	± 10%(198~242 V)				
Input	Frequency Tolerance	± 5%(47~63 Hz)				
Cooling Method		Natural Cooling				
Control Method		Fixed torque				
Enclosure Rating		IP54				
Efficiency (%)		83.5% at 1,050rpm/16.1 oz-ft				

Appendix A Specifications | IBLM Series

Appe	Appendix A Specifications IBLM Series					
			General Specifications			
Control Characteristics	Control System		Sensorless			
	Speed Setting Resolution		1 RPM			
	Output Speed Resolution		1 RPM			
	Torque Cha	racteristics	Starting torque can be 150% rated torque at 80RPM			
Cha	Overload Er	ndurance	150% of rated current for 1 minute			
	Accel/Decel	Time	0.2 to 15 seconds			
ics	Speed	Communication	By RS-485			
nting erist	Setting	External Signal	By external terminals			
Operating Characteristics	Operation Setting Signal	Communication	By RS-485			
S o		External Signal	By external terminals			
Protection Functions			Over voltage, over current, low voltage, motor overload, ground fault, drive overload and drive overheating			
Built-in Functions			Built-in AVR, 3 fault records, forward/reverse operation setting, output speed upper/lower limits, parameter reset, abnormal reset			
ns	Pollution De	egree	2			
Environmental Conditions	Installation	Location	Altitude 1,000 m or lower, indoor/outdoor (keep from corrosive gasses, liquid and dust)			
	Ambient Te	mperature	-40°C to 60°C (40°C for side-by-side mounting) Non-Condensing and not frozen			
	Storage Te	mperature	-40 °C to 70 °C			
	Ambient Hu	midity	0 to 100% RH (non-condensing)			
Env	Vibration		9.80665m/s² (1G) less than 20Hz, 5.88m/s² (0.6G) at 20 to 50Hz			

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Appendix B VFD PC Software



- Make sure that the wiring is correct.
- Verify that no other equipment is connected to the motor.
- Do NOT operate with humid hands.



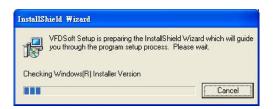
It should be stopped when fault occurs during running.

B.1 Installation

Step 1. Please download the installation file from Delta's website: http://www.delta.com.tw/



- Step 2. Please execute the installation file by double clicking on the icon VIDOOPT_who Area
- Step 3. Detecting system information

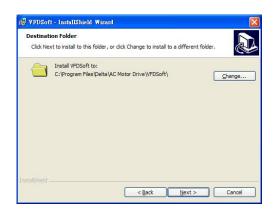


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Step 4. This is a welcome dialogue box; please click _______ to continue this installation process.

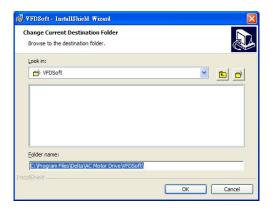


Step 5. If you want to change the folder's installation destination, please click to go to step 6; or click to go to step 7.

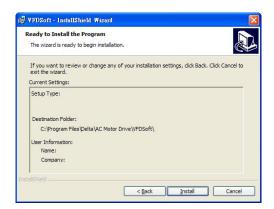


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Step 6. Please select a destination folder according to your preference.



Step 7. Ready to install, please click Install to continue if all settings are OK.



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Step 8. It's installing



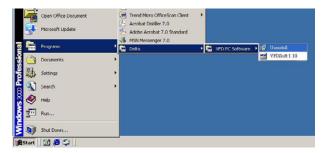
Step 9. This installation has been completed; please click Finish to end this program.



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B.2 How to uninstall

1. Open executable file Uninstall



2. If you really want to uninstall, please click



3. Uninstalling



B.3 Communication Method

 Before connecting a PC to IBLM, it needs to prepare RS485/232/USB converter, RS232 cable or USB cable to connect to IBLM via RJ45.

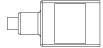


Figure 1 RJ45 connector

2. The IBLM is connected to a PC via RS485/232/USB converter. In RS485(RJ45), PIN6 must be +5VDC external power and PIN7 must be grounded as shown in the following.

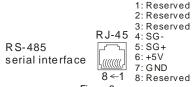


Figure 2

3. After executing VFDSoft, you'll get the following display (figure 3). It'll display figure 4 after pressing "Advance".



Figure 3



Figure 4 VFD Soft - Advance

4. After pressing "Protocol" button, you'll get the following display for communication setting and test.

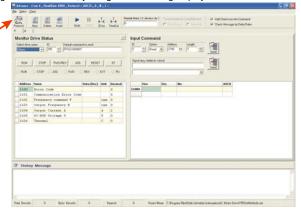


Figure 5 VFDSoft - Protocol

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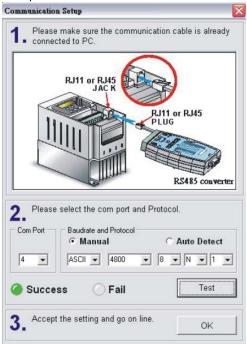


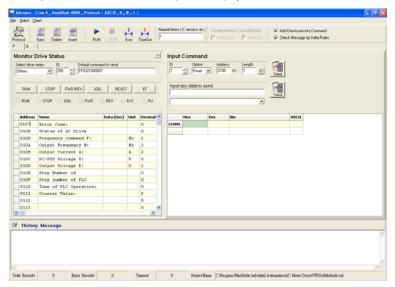
Figure 6 Communuication settings

5. Please set COM port and protocol correctly. In the baudrate and protocol, please set it to "Manual" and "ASCII, 4800, 8, N, 1". Then pressing Test for communication test. After successful communication connection with Success, please press OK for connecting to drive. If it displays Fall after communication test, please check if there is anything wrong in communication port or wiring.

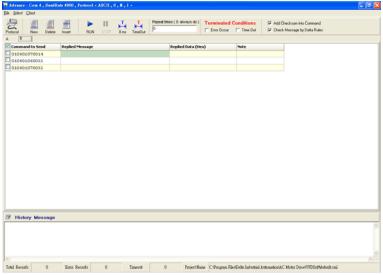
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B.4 Communication Operation

- 1. Monitor Drive Status
 - Step 1. Input the suitable command in the field of "Input any data to send" (please refer to
 - Pr.01-01: communication address). Then, press send on the right of the field to execute this command.
 - Step 2. Please choose "Others".
 - Step 3. Press Run
 - Step 4. The status after drive start-up will be displayed in this area.



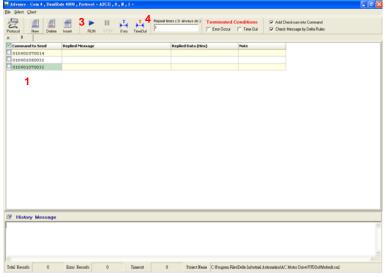
2. After pressing "label B", it will show the following display.



- Step 1. Input the communication command into "Command to Send" (refer to Pr.01-01)
- Step 2. You can choose check or not in the front square \square .
- Step 3. Then it'll execute those commands with after pressing
- Step 4. If inputting "1" into the field "Repeat times", it means that it will execute items after pressing

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Example: 010602070014, 010601060032, 010601070032

06: write command (03: read command)

0207: parameter position (1st step speed/torque setting)

0106: acceleration time setting

0107: deceleration time setting

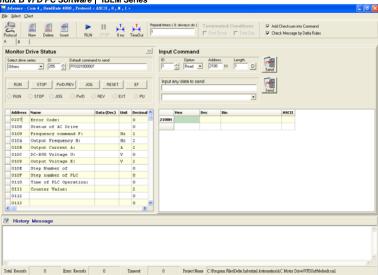
0014=1*16+4*1=20% for 1st step speed/torque setting

0032=3*16+2=50*0.1=5.0 sec for acceleration/deceleration time (because it has a decimal place setting, it needs to *0.1)

Step 5. It can return to the display of "Monitor Drive Status" by pressing "A". Input the suitable

command in the field of "Input any data to send" (please refer to Pr.01-01: communication address).

Then, press send on the right of the field to execute this command.



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